1. The response of the applicant has been read and given careful consideration. Responses to the arguments of the applicant are presented after the first rejection to which they are directed. Rejection of the previous action not repeated below are withdrawn.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 63 and 65-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keys et al. '102, in view of Monroe '790, Stevenson '409, Haugh '526 and Baum et al. '275.

Keys et al. '102 teaches in example 55, the use of a 514 (the emission line is actually 514.5 nm) from an argon ion laser in a composition if Vinac (PVAc binder), Photomer (acrylate monomer), SR-349 (diacrylate monomer), TBPM (methacrylate monomer), HABI (photoiniaitor, MMT, FC and JAW (sensitizing dye) which after processing including heating forms a hologram which replays at 508 nm with a diffraction efficiency of 98%. (9/15-51,19/3-48,34/57-35/20). Useful bis(p-dialkylaminobenzylidene)ketones are disclosed by Baum 3,652,275) and include DEAW, DMJDI, and DBC (9/15-25, 8/62-9/52). Compositions 14-20 are similar, but use DEAW (cyclopentanone, 2,5-bis{[4-(diethylamino)-phenyl]methylene} (1912-13) as the sensitizer. The use of the media with a 488, 514 (514.5) or 645 nm laser is disclosed (15/62-64). The formation of reflection holograms by passing the reference beam through the holographic recording materials and having an object reflect the light back to the medium (beam traveling in the opposite direction) so the beams interfere. (2/3-36).

Stevenson ‘409 teaches the duplication/copying of holograms using contact copying using a beam of coherent light (laser) to expose a photopolymeric holographic recording material in contact with a master hologram. In the case of copying a reflection hologram, the master and photopolymer are contacted and the light is incident from the side of the recording material (reference light) and the reflection from the master hologram corresponds to the object beam [0004].

Haugh '526 teaches the use of either two beams exposure (Example XXXVI) or contact copying methods (example I) for forming volume holograms. Contact copying is much quicker than forming multiple originals and can be used with in expensive incoherent light sources.

Monroe '790 establishes the absorption maxima and absorptivity of these sensitizing dyes (col 15).

Compound	λ_{max}	ϵ_{max}	ϵ_{488}	ϵ_{532}
DBC	481 nm	59,200	57,400	7,200
DEAW	477 nm	74,000	65,200	3,100
DMJDI	442 nm	37,400	6,900	0
JAW	496 nm	59,600	57,600	21,300

The holographic recording compositions using DEAW are anticipated by the examples, but their use with a 514.5 nm laser is not. The examples using JAW and the 514.5 nm argon ion laser line anticipate the composition claims and method claims rejected under this heading.

Baum et al. ‘275 is referred to by Keys et al. ‘102 for the teachings of sensitizers. The general formula is presented in column 2 and R_1 or R_2 can be hydrogen or C1-4 alkyl. (2/15-34).

It would have been obvious to one skilled in the art to modify the teachings of Keys et al. ‘102 by using a contact copying process such as that taught by Stevenson ‘409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching

of Haugh '526 and the teachings of Keys et al. '102 in column 3 and Monroe '790 establishes the absorption maxima and absorptivity of these sensitizing dyes, to use the 514.5 nm laser taught at 15/62-64 of Keys et al. '102 and to use 2,5-(bis(4-butylaminobenzylidene)cyclopentanone in place of DEAW based upon the disclosure of the general formula in Baum et al. '275 with a reasonable expectation of success based upon DEAW having significant absorption (molar absorptivity) between 488 and 532 nm as evidenced by Monroe '790 and the direction to Baum et al. for useful photoinitiators in Keys et al. '102.

The applicant argues that the compound D-3 has a different absorption form the claimed compound. It may be that the measurements were made in different solvents, but the applicants position is untenable as **the compound DEAW is the same compound as compound 3 previously in the claims and the butylhomologue is known as a useful photoinitiator in the photopolymer art as evidenced by Baum et al. .** The rejection stands noting that the use of the DEAW, the ethyl analogue is compound 4, in the claims is evidenced to have sensitivity at 532 nm, which is more than 14 nm from the 477 nm absorption and one skilled in the art would not expect a significant shift in absorption when using butyl (C4) moieties, rather than ethyl (C2) moieties given these are closely related alkyl chains. While the use of the composition with lasers offset from the absorption/sensitization maximum may not be optimal, there is a reasonable expectation of the dye being useful with various laser wavelengths covering a significant portion of the spectrum (note the use of DEAW with 488 and 532 nm, which are separated by 44 nm.). The examiner also notes that the laser wavelengths disclosed instant specification and recited in the claims are not from tunable lasers and so these lasers are

somewhat inflexible in their emissions as they can only be tuned to specific emission lines corresponding to lasing transitions.

4. Claims 63-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keys et al. '102, in view of Monroe '790, Stevenson '409, Haugh '526 and Baum et al. '275, further in view of Asakawa et al. '598.

Asakawa et al. '598 teaches the use of dyes, such as cyclopentanones, dipehyliodonium salts or combination of these salts and dyes. (19/28-30) 2,5-(bis(4-ethylaminobenzylidene) cyclopentanone is used in an example (20/30-31). The use of holographic recording is disclosed (col 19)

It would have been obvious to one skilled in the art to modify the processes rendered obvious by the combination of Keys et al. '102, Monroe '790, Stevenson '409, Haugh '526 and Baum et al. '275 by using other photoinitiators, such as diphenyliodonium salts taught by Asakawa et al. '598 as useful with cyclopentanone sensitizers for sensitizing photopolymerizbale composition useful for holographic recording with a reasonable expectation of success based upon this teaching within the art.

The rejection stands for the reasons above without further comment.

5. Claims 57-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabata et al. '340, in view of Harada et al. JP 01-287105, Stevenson '409 and Haugh '526.

Kawabata et al. '340 in example 24 uses dye 4 (15/12-13) with a cationically polymerizable compound , a free radically polymerizable monomer , a diphenyliodonium salt, and a binder (P-1) and uses 632.8 nm light to record a hologram (12/16+ and). Other cyanine sensitizing dyes are disclosed, such as those taught by JP 01-287105 and dye 2-[[3-allyl-4-oxo-5-

(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]-3-ethyl-4,5-diphenylthiazolinium iodide.

Harada et al. JP 01-287105 teaches various counterions/anions for the dyes for formula A (page 1) including halides, tetrafluoroborate, hexafluorophosphate, perchloriate, methylsulfate and toluenesulfate (page 2/lower left column). Specific examples of dyes bounded by A are illustrated the lower right column of page 4 (note dye A-3). These are disclosed as useful in sensitizing onium salts. (abstract and formula III on page 3).

It would have been obvious to one skilled in the art to modify the medium of example 24 of Kawabata et al. '340, by using another disclosed dye, such as 2-[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]3-ethyl-4,5-diphenylthiazolinium but with a different counterion with a reasonable expectation of success based upon the disclosure of equivalence in the references and to modify the recording process using contact copying process to form a copy of the hologram as taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Kawabata to the formation of reflection holograms.

The applicant argues that the dye 4 of 1,3,5-thiadiazolidene ring which is different form that of the claim. This is admitted as the rejection is a 103 rejection and not a 102 rejection, but the applicant does not address the dye 2-[[3-allyl-4-oxo-5-(3-n-propyl-5,6-dimethyl-2-benzothiazolidene)-ethylidene-thiazolidene]methyl]3-ethyl-4,5-diphenylthiazolinium iodide taught at 5/18-19, which is the same dye as in the claims (the naming differs only in the order of recitation). The dye is used with 632.8 nm laser which is more than 14 nm from the absorption

(602 nm) disclosed in the specification in table 1. While the use of the composition with lasers offset from the absorption/sensitization maximum may not be optimal, there is a reasonable expectation of the dye being useful with various laser wavelengths covering a significant portion of the spectrum (note the use of DEAW with 488 and 532 nm, which are separated by 44 nm.). The examiner also notes that the laser wavelengths disclosed instant specification and recited in the claims are not from tunable lasers and so these lasers are somewhat inflexible in their emissions as they can only be tuned to specific emission lines corresponding to lasing transitions.

6. Claims 69-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okubo et al. '324, in view of Ernst et al. DE 100571141, Yamaguchi et al. JP 06-175554, Stevenson '409 and Haugh '526.

Okubo et al. '324 in example 21 teaches a composition of dye D-22 (see col 11-12), a photoinitiator, acrylates, an iron arene initiator. (19/65-20/25). Sample 14 teaches this is an iodonium salt (col 21-22) See 14/40-47 for iodonium salts. These can be used with 488 or 532 nm lasers (2/40) and for holography (1/18). Useful terminal moieties are disclosed. (col 4).

Ernst et al. DE 100571141 teaches various 2,4,6,-pyrimidinetrione compounds bounded by the formula I for sensitizing photopolymerizable compositions. Y can be S or O, X can be methylene, oxygen, or sulfur and R2 and R3 can be hydrogen, methyl or ethyl and R1 and R5 can be alkyl. (abstract and page 3/lines 1-16). These are useful in the 370-430 nm range.

Yamaguchi et al. JP 06-175554 in example 1 teaches a rhodanine dye , PMMA, an acrylate, and an iodonium salt photoinitiator which us coated and exposed to 488 nm laser light to form a hologram with 70% diffraction efficiency.[0044-0046] In examples 2-4, the 488 nm

laser was used. [0047]. 514 and 633 nm lasers were also used. (see table). The use of a HeCd laser (442 nm) is also disclosed.

To address the embodiments using compound 5 of the claims, the examiner cites Ernst et al. DE 100571141 and holds that it would have been obvious to modify the cited compositions of Okubo et al. '324 and processes using them by using other similar pyrimidinetrione compound known to sensitize photopolymer composition, such as those of Ernst et al. DE 100571141 with a reasonable expectation of successfully forming a photopolymerizable composition and recording a hologram therein with a blue laser and cites Yamaguchi et al. JP 06-175554 to establish that the use of similar rhodanine dyes to sensitize iodonium salts in holographic recording systems to 488 nm lasers is known and provide support for a reasonable expectation of success. Additionally, it would have been benzothiazolyl moieties based upon the leftmost structure at 4/25, dye D-17 and where Y is sulfur 4/38) and to modify the recording process using contact copying process to form a copy of the hologram as taught by Stevenson '409 to save time in forming holographic duplicates with a reasonable expectation of success based upon the teaching of Haugh '526 and the teachings of Yamaguchi et al. JP 06-175554 to the formation of reflection holograms.

While the use of the composition with lasers offset from the absorption/sensitization maximum may not be optimal, there is a reasonable expectation of the dye being useful with various laser wavelengths covering a significant portion of the spectrum (note the use of DEAW with 488 and 532 nm, which are separated by 44 nm.). The examiner also notes that the laser wavelengths disclosed instant specification and recited in the claims are not from tunable lasers and so these lasers are somewhat inflexible in their emissions as they can only be tuned to specific emission lines corresponding to lasing transitions. The utility of the dyes over a wide

range is disclosed. **The comparative examples of the application use different dyes form those of the inventive examples and so do not represent a comparison with the closest prior art. The applicant could show evidence that the exposure wavelength with the dyes recited is critical.**

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kelly Cynthia can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Primary Examiner
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